

NONPROVISIONAL PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

CLIFF & BERRIDGE, PLC
Box 19928
Alexandria, Virginia 22320
Telephone: (703) 836-6400
Facsimile: (703) 836-2787

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BOX PATENT APPLICATION

**NONPROVISIONAL APPLICATION TRANSMITTAL
RULE §1.53(b)**

Assistant Commissioner for Patents
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Sir:

Transmitted herewith for filing under 37 C.F.R. §1.53(b) is the nonprovisional patent application

For (Title): USING STRUCTURED REPRESENTATIONS TO INDEX RECORDINGS OF
ACTIVITY

By (Inventors): Scott L. MINNEMAN (San Francisco, California), William VAN MELLE (Los Altos,
California), Steve R. HARRISON (Portola Valley, California), and Ian Emery SMITH
(San Francisco, California)

- ☒ Formal drawings (Figs. 1-8; 8 sheets) are attached.
☐ A Declaration and Power of Attorney is filed herewith.
☐ An assignment of the invention to _____ is filed herewith.
☐ An Information Disclosure Statement is filed herewith.
☐ A Preliminary Amendment is filed herewith.
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INDEP CLAIMS	2 - 3	= 0	x 78	\$ -
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIMS PRESENTED			+260	\$
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Respectfully submitted,


James A. Cliff
Registration No. 27,075

Stephen J. Roe
Registration No. 34,463

JAO:JHV/jck

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09/223016
j:542 U.S. PTO

USING STRUCTURED REPRESENTATIONS TO INDEX RECORDINGS OF ACTIVITY

BACKGROUND OF THE INVENTION

1. Field of Invention

5 This invention is directed to systems and methods for individuals and groups to index, locate and review recently recorded events.

2. Description of Related Art

 In interactions among people, conversation often ranges widely and previous topics and ideas are often forgotten. Similarly, a person performing a task can make a
10 recording of the task to allow that person's performance to be reviewed. It is possible to make audio or video recordings as records of these interactions and actions, because of the linear nature of those records.

SUMMARY OF THE INVENTION

 However, it is difficult to refer back to the previously-recorded portions of a
15 recording of an on-going activity, especially if the user would like to immediately include a portion of the recording of the activity at a later portion of the recording that same on-going activity.

 Searching a traditional audio or video tape, even if it has been produced with a time code, requires a secondary index, such as meeting notes, to find and replay those
20 recordings within the immediate context of a meeting.

 Additionally, the fine-grained synchronization of ideas and activity within a group might be the provocation for replaying some earlier recorded-material. For example, someone may ask "Where were we?" or a new participant may enter the room and join in the discussion and thus require an explanation of the current state of
25 the discussion.

 This invention provides systems and methods for using structured representations to index recordings of activity.

 This invention separately provides systems and methods that allow users to index, locate and review recorded events.

30 This invention separately provides systems and methods that enable a user to replay a previously-recorded portion of a recording and have that replayed portion copied or added to the recording at a later point.

The systems and methods of this invention use an index and a digital audio and/or video recording to provide access to recent digitally recorded material. For example, users initiate recordings of audio and/or video data, make an index, i.e., make notes or agenda about the contents of the recordings, and use those notes to randomly access the recordings for playback.

The systems and methods of this invention additionally provide an interface that correlates events and the corresponding notes with the recordings. This interface uses visual representations that are part of the content of meetings as the basis of marking and identifying events.

Furthermore, the systems and methods of this invention provide an environment in which a user who is recording and indexing an activity can replay a previous portion of the recording of that same activity and have the previously recorded section re-recorded into the recording at the current indexing point.

In an exemplary scenario, a meeting has been called, to begin at a predetermined time. The agenda includes five items and the agenda has been input into a system according to this invention and is displayed to the participants. During the meeting, as each new agenda item is begun, the moderator "checks off" that new agenda item on the agenda index to a recording of the meeting. This creates an index to the recording indicating the checked agenda item is being discussed. A participant is called out of the meeting, and thus misses a couple of items. Following the meeting, the participant can select the agenda items that were missed. The recording of the discussion for those selected events is replayed based on the selected agenda items.

While this is a simple example, the idea has a number of powerful variations. Specifically, the index or "agenda items" might be elements of diagrams or process representations. The representations used for the index, and for retrieving segments of the recording need not contain much detail. The "agenda items" can also be used to guide participants through structured recording activities.

Continuing with the above example, as each task item on the agenda comes up for review, that agenda item is 'checked'. Following the activity, the various participants have a record of what was said about the status of tasks that may be of importance to them.

By way of another example, the systems and methods of this invention could be employed by someone repairing a complex piece of equipment. This piece of equipment has very high tolerances but the service technician may be unfamiliar with the machine. As the machine is disassembled, the technician's actions are recorded.

5 As sub-assemblies are removed, the technician clicks on the image of the sub-assembly in the documentation on a display to create an index into the recording. During re-assembly, the technician encounters a part that does not seem to fit. The technician can then click on the image in the display. The previously-recorded removal sequence performed by that technician is replayed, to show that technician
10 how he removed the part and thus help him replace the part.

In a further exemplary scenario, an insurance claims adjuster can use the systems and methods of this invention when examining an automobile. The claims adjuster has a video camera. The system displays an image of a claim form. It highlights sections that the adjuster should record with the video camera. The adjuster
15 then clicks through the parts that are irrelevant to this particular claim and continues on to the next desired element.

The systems and methods of this invention actively mediate between the temporal recording and notes and records made using other media or systems. The systems and methods of this invention link images used in the supported processes
20 with the recordings of those activities.

These and other features and advantages of this invention are described in or are apparent from the following detailed description of the preferred embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

The preferred embodiments of this invention will be described in detail, with
25 reference to the following figures, wherein:

Fig. 1 is a functional block diagram of an object description file according to this invention;

Fig. 2 is an example of an agenda;

Fig. 3 is a functional block diagram of the indexed recording system according
30 to this invention;

Fig. 4 is a functional block diagram of the input/output features of the indexed recording system according to this invention;

Fig. 5 is an exemplary functional block diagram of the indexed recording system according to this invention in use;

Fig. 6 is a flowchart outlining the recording, indexing, and playing process when there is no predefined agenda according to this invention;

5 Fig. 7 is a flowchart outlining the indexing, recording, and playing process for a predefined agenda according to this invention; and

Fig. 8 is a temporal graph of an exemplary recording session.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

10 Fig. 1 shows one embodiment of an object description file 100 according to this invention. The object description file 100 provides a data structure which indexes recordings of an activity. The object description file 100 is a database which stores an index 105. The index 105 can be derived from a number of sources or can be generated in real time as an activity, such as a recorded meeting, proceeds.

Specifically, the index 105 in the object description file 100 can be a
 15 predefined document 110 which is loaded into the system prior to commencement of the activity to be recorded. Furthermore, the index 105 in the object description file 100 can be generated from user input 120. In this instance, as an activity proceeds, the moderator of that activity can index, i.e., timestamp, specific portions of the recorded/recording activity and label them with a corresponding name.
 20 Additionally, the index 105 in the object description file 100 can be extracted from an already existing document 130. In this instance, the already existing document 130 can be further annotated. Furthermore, the object description file 100 can be derived from a scanned document 140 which is input to the system.

All of these methods of input provide an object description file 100 which is
 25 an index 105, such as, for example, the agenda 115 shown in Fig. 2, for temporally tracking the recordings of an activity. Fig. 2 illustrates the exemplary agenda 115. Each item on the agenda 115 corresponds to a location in the associated audio/video recording. The agenda 115 can correspond, for example, to an already-recorded meeting as illustrated by agenda item 5.1.1. In this instance, agenda item 3.1, in
 30 whole or in part, is incorporated into the subsequent agenda item 5.1.1. If a user selects an 'item' in the agenda 115, the portion of the recorded video/audio corresponding the selected agenda item is then enabled for replay.

Fig. 3 is a block diagram of an activity indexing system 200 according to this invention. The activity indexing system 200 includes a recording subsystem 210, an editing subsystem 220, a playback subsystem 230, a controller 240, an input/output interface 250, audio/video storage 260 and the object description file 100.

5 The recording subsystem 210 records audio and/or video data of the activity. The editing subsystem 220 allows users to return after recording the activity to further augment the recording.

10 The playback subsystem 230 allows activity participants or others to view a previously-recorded activity at a later time, which may occur during the recording of the activity itself. Thus, the playback subsystem 230, in conjunction with the recording subsystem 210, allows simultaneous recording of the activity and playing back of the recording, so that activity participants may review a previously-recorded and indexed portion of the activity, while that review is simultaneously being recorded by the recording system 210 and indexed to the current index heading.

15 The input/output interface 250 enables communication between the activity indexing system 200 and the various types of recording and playback devices. The audio/video storage 260 is a memory device that is capable of storing audio and/or video data.

20 Fig. 4 shows some of the typical input/output devices that can be used in conjunction with the activity indexing system 200. The activity of the input/output devices is monitored by the controller 240 and routed through the input/output interface 250. The input/output devices can include a display device 2500, such as a TV, monitor or touch screen, a slide projector 2510, a printer 2520, a speaker 2530, a mouse 2540, a microphone 2550, a keyboard 2560, an electronic pen 2570, an electronic whiteboard 2580, a video recorder 2590 or any other device capable of receiving or conveying information between a user and the system. However, it should be appreciated that any known or later developed input/output device that is capable of recording an activity, replaying that same activity to a user, and/or recording a user's inputs, can be used in conjunction with the system.

30 The functionality of the input/output devices in Fig. 4 becomes more apparent if viewed in conjunction with Fig. 5. Fig. 5 functionally shows how the system 200 interacts with user 500.

As described in the previous examples, a user 500 could, for example, be a service technician or a meeting moderator who wishes to record the proceedings of a particular activity. Through the input/output devices, a selector 330, a microphone 255 and a video recorder 259, the user's activities are recorded in the audio/video storage 260 via the appropriate input/output devices. It should be appreciated that this set of input devices is exemplary only and that any known or later developed input device would be used instead of or in addition to those shown in Fig. 5.

The selector 330, in response to the user's 500 actions, appropriately selects an item from the agenda 115 displayed on the display 300 to which the recorded events will be indexed. Therefore, as the activity progresses, the selected index items are associated with particular portions of the recording of the activity being recorded. In particular, the recording of the activity is indexed to the index 105 and stored in the object description file 100 in conjunction with a system clock 320. As described earlier, this indexing can occur progressively, i.e., as the user steps through an agenda which is shown, for example, on the display 300, or "on the fly." In the case of "on the fly" indexing, as new "headings" are encountered or generated during the activity, index markings associated with those activities are registered in the object description file 100.

However, it should be appreciated the activity indexing system 200 is not limited to the particular embodiment shown in Fig. 5. Specifically, any combination of known or later developed input/output devices could be used provided the selected components that allow for capturing of a particular activity. Additionally, the components should be selected to enable a user to correlate an index, such as an agenda, to the particular events as they are recorded. Thus, the device with which the user interacts to enter or indicate an index item can include, but is not limited to, a keyboard, a mouse, a joystick, a touch screen, an electronic pen, a track ball, a touch pad, or the like.

Fig. 6 is a flowchart outlining one exemplary embodiment of an indexing method according to this invention. Specifically, Fig. 6 outlines a method of recording and indexing where there is no pre-existing agenda and the agenda is created "on the fly." Starting in step S100, control continues to step S200, where recording the user's actions begins. Next, in step S300, the user is prompted to add an

index item corresponding to the currently recorded material. Then, in step S400, a determination is made whether the user wishes to replay a previous portion of the recording. If replaying a previous portion is desired, control continues to step S500. Otherwise, control jumps directly to step S600. In step S500, a previously recorded
 5 portion is replayed and the act of replaying this previously-recorded portion, and the previously-recorded portion itself, becomes part of the recording of this agenda item. Control then continues to step S600.

In step S600, a determination is made whether another index item corresponding to the now-current location of the recording is desired. If an additional
 10 index item is to be added, control jumps back to step S400. However, if additional index items are not required, control continues to step S700. In step S700, recording ends. Control then continues to step S800, where the control sequence ends.

Fig. 7 is a flowchart outlining another exemplary embodiment of an indexing method according to this invention. Specifically, Fig. 7 outlines a method of indexing
 15 and recording where there is a predefined agenda and recordings are made corresponding to a selected index item. Starting in step S1000, control continues to step S1100 where an object description file is initialized to provide an agenda template from which the user selects an index item or to which the user can add an index item. The recording will then be correlated to the agenda. Next, in step S1200,
 20 the recording of the activity is begun. Then, in step S1300, a determination is made whether a previous portion of the recording is to be replayed. If a previous portion is to be replayed, control continues to step S1400. Otherwise, control jumps directly to step S1500. In step S1400, a previous portion of the recording is replayed and the act of replaying this previously-recorded portion, and the previously-recorded portion
 25 itself, become part of the recording of this agenda item. Control then continues to step S1500.

In step S1500, recording of the activity relative to this agenda item ends. Then, in step S1600, a determination is made whether another index item has been selected or added. If further indexing and recording is desired, control jumps back to
 30 step S1200. Otherwise, control continues to step S1700. In step S1700, the control sequence ends.

With reference to Figs. 6 and 7, it should be appreciated that a user can switch back and forth between these methods depending on the desired function. For

example, a user, after recording a session according to the method outlined in Fig. 6, may decide to go back and add an additional index item or modify an index item using the method outlined in Fig. 7. Alternatively, after adding an index item with the method outlined in Fig. 7, a user may desire to start an entirely new recording and thus would begin with the method outlined in Fig. 6, in the instance where there is no predefined agenda, and the method outlined in Fig. 7, where there is a predefined agenda.

Fig. 8 is an exemplary temporal graph illustrating how a sequence of events may occur during the recording of an activity. Specifically, as agenda items 1-5 are encountered, various start and stop control sequences are initiated to control replaying various items and pausing the recording of the activity. As shown in Fig. 8, at time t1, recording of agenda item 1 begins. At time t2, recording of agenda item 2 begins. Then, at time t3 recording the agenda item 3 commences. Next, at time t4, a previously-recorded agenda item is replayed and recorded as part of the third agenda item. At time t5, the replaying of that replayed agenda item stops. Then, at time t6, new agenda item 4 is selected to index the recording.

At time t7, a stop command is encountered, pausing the recording of the activity. Next, at time t8, the recording of the activity begins again. At time t9, another previously-recorded agenda item is replayed as part of the fourth agenda item. Then, at time t10, the replaying of that previously-recorded agenda item stops. At time t11, the recording is indexed to the fifth agenda item, as the activity being recorded moves from the fourth agenda item to the fifth agenda item.

As shown in Fig 3, the recording and playback device 200 is preferably implemented on a programmed general purpose computer. However, the recording and playback system 200 can also be implemented on a special purpose computer, a programmed microprocessor or microcontroller and peripheral integrated circuit elements, an ASIC or other integrated circuit, a digital signal processor, a hard-wired electronic or logic circuit such as a discrete element circuit, a programmable logic device such as a PLD, PLA, FPGA or PAL, or the like. In general, any device, which is capable of implementing a finite state machine that is in turn capable of implementing the flowchart shown in Fig. 6, can be used to implement either the activity indexing system 200.

It is, therefore, apparent that there has been provided in accordance with the present invention a method and apparatus for using structured representations to index recordings of activity. While this invention has been described in conjunction with preferred embodiments thereof, it is evident that many alternatives, modifications, and variations be apparent to those skilled in the art. Accordingly, applicants intend to embrace all such alternatives, modifications and variations to fall within the sphere and scope of this invention.

5

WHAT IS CLAIMED IS:

1. A system that uses structured representations to index recordings of activity comprising:
 - an object description file that stores at least one index;
 - 5 a user input device that selects at least one item of the at least one index; and
 - an association device that associates the selected at least one item with a recording of an activity.
2. The system of claim 1, further comprising a recording system that

10 records the activity.
3. The system of claim 2, wherein the recording system allows a previously recorded activity to be inserted in a current recording.
4. The system of claim 1, further comprising an audio/video storage

device that stores a recorded activity.
5. The system of claim 1, further comprising a playback system for

15 replaying an indexed recording.
6. The system of claim 5, wherein the playback system can replay a portion of the indexed recording in response to selecting an item from the at least one index.
7. The system of claim 1, further comprising an editing system that

20 allows modifications to a recorded activity.
8. The system of claim 1, further comprising a display device that displays at least one of the at least one index, the at least one item and the recording.
9. The system of claim 1, wherein the association device temporally

25 associates the recording of an activity with the selected at least one item.
10. A method of using structured representations to represent recordings of activity comprising:
 - storing at least one index;
 - selecting at least one item of the at least one index;
 - 30 recording an activity; and
 - associating the selected at least one item with the recorded activity.
11. The method of claim 10, further comprising using a recording system to record the activity.

12. The method of claim 11, wherein recording an activity further comprises recording a previously recorded activity into a current recording.

13. The method of claim 10, further comprising storing a recorded activity in an audio/video storage device.

5 14. The method of claim 10, further comprising using a playback system for replaying an indexed recording.

15. The method of claim 14, wherein the playback system can replay a portion of the indexed recording in response to selecting an item from the at least one index.

10 16. The method of claim 10, further comprising editing a recorded activity.

17. The method of claim 10, further comprising displaying at least one of the at least one index, the at least one item and the recording.

18. The method of claim 10, further comprising temporally associating the recording of an activity with the selected at least one item.

15 19. The method of claim 10, wherein the recording of an activity is an audio recording.

20. The method of claim 10, wherein the recording of an activity is a video recording.

20 21. The method of claim 10, wherein the recording of an activity is a multimedia recording.

ABSTRACT OF THE DISCLOSURE

The systems and methods of this invention use an index and digital audio and/or video recordings of an activity to provide access to recently recorded material. For example, users initiate audio and/or video recordings. An index, e.g.,
5 an agenda, outlines the structure of the to be recorded event. The user selects an index item as an activity that corresponds to an index item is recorded. The recordings are then associated with the index. The user can then randomly access the recordings for playback, editing or further recording. The systems and methods of this invention additionally provide the means for correlating events and the corresponding index
10 items with the recordings.

15

100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000

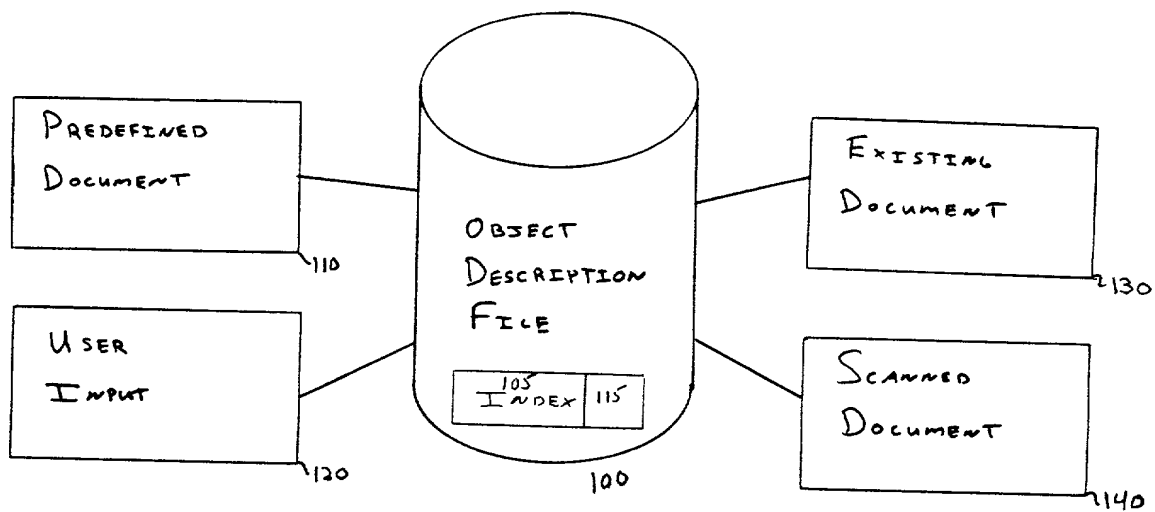


Fig. 1

Agenda

1. Item 1
2. Item 2
3. Item 3
 - 3.1. Item 3.1
 - 3.2. Item 3.2
4. Item 4
5. Item 5
 - 5.1. Item 5.1
 - 5.1.1. Replay of Item 3.1
6. End

115

Fig. 2

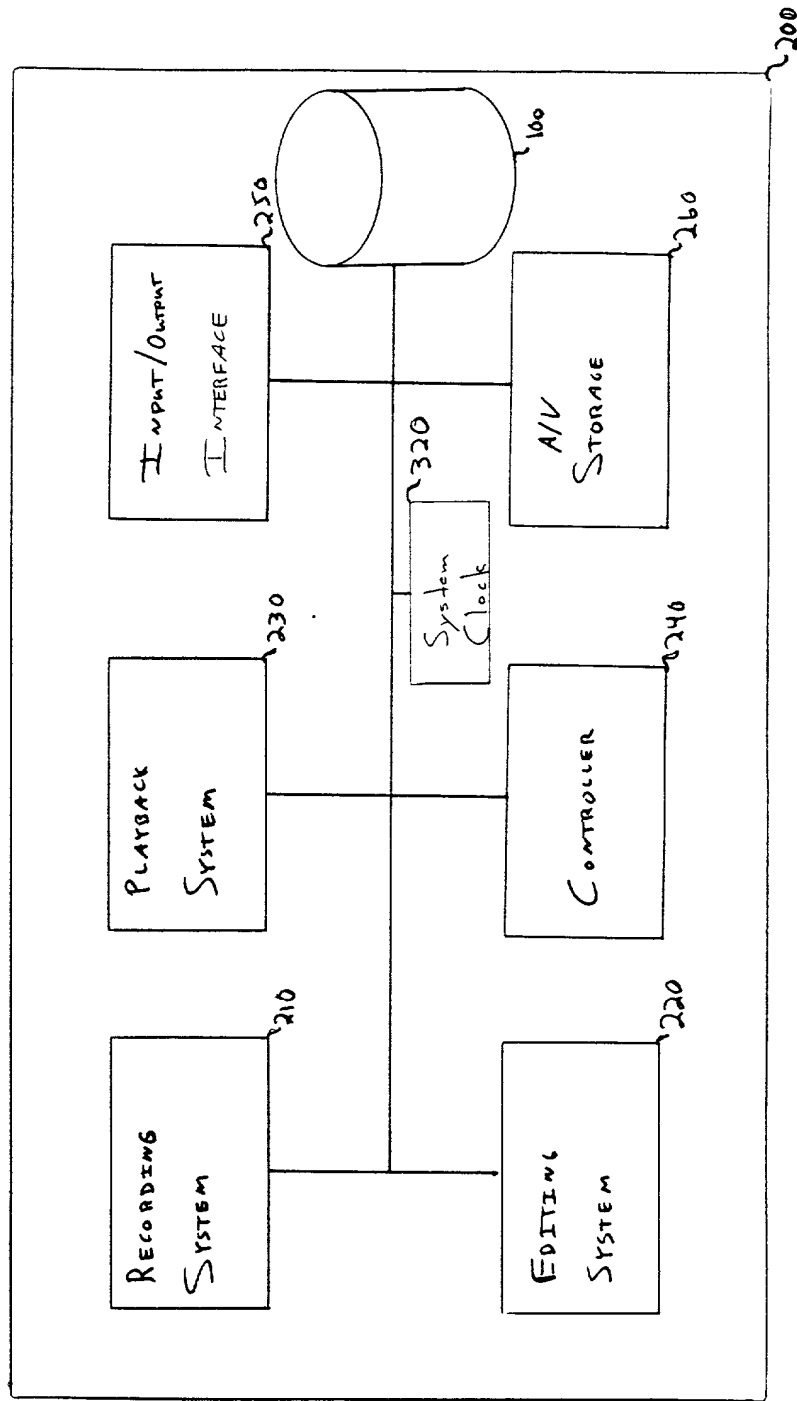


Fig. 3

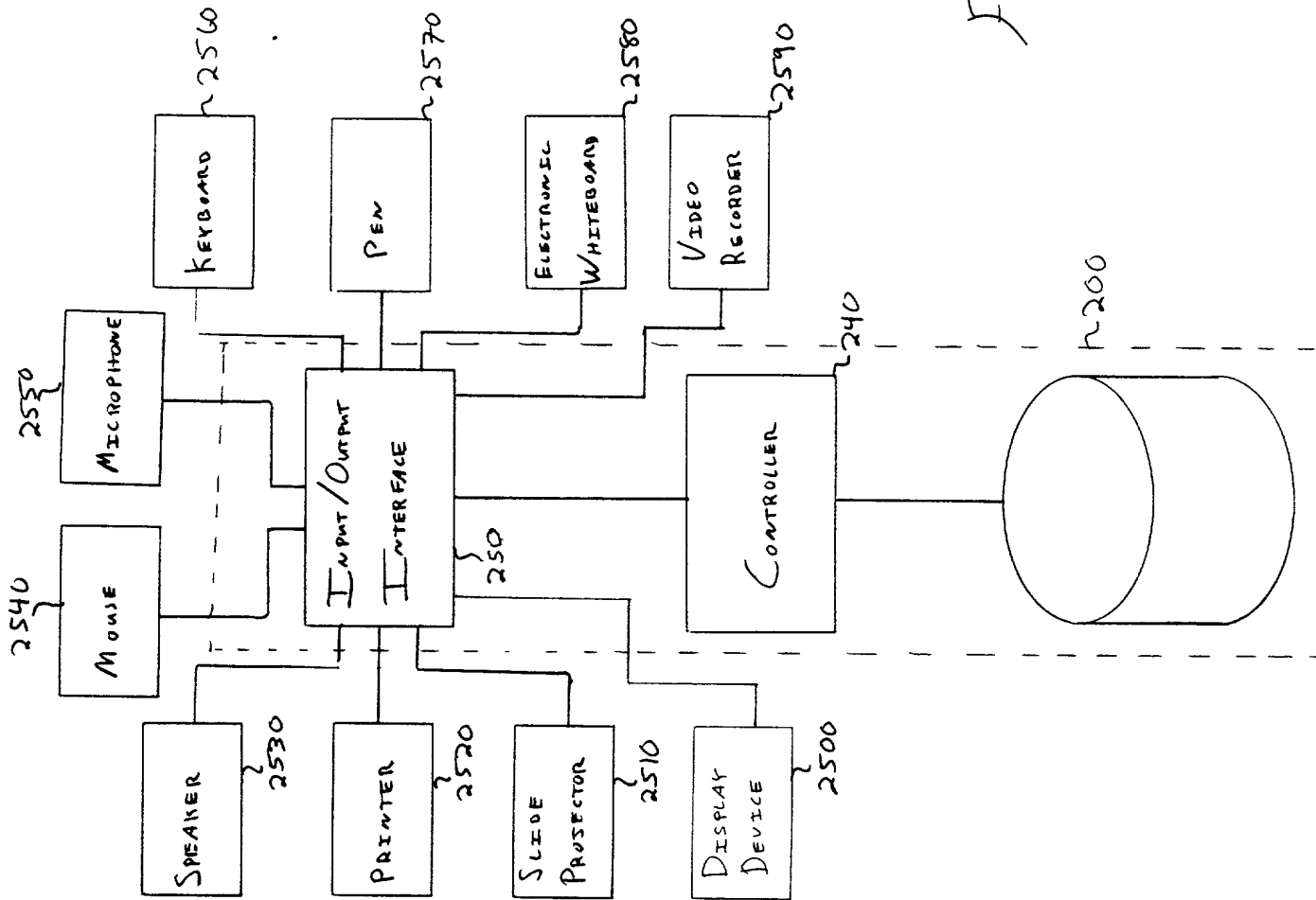
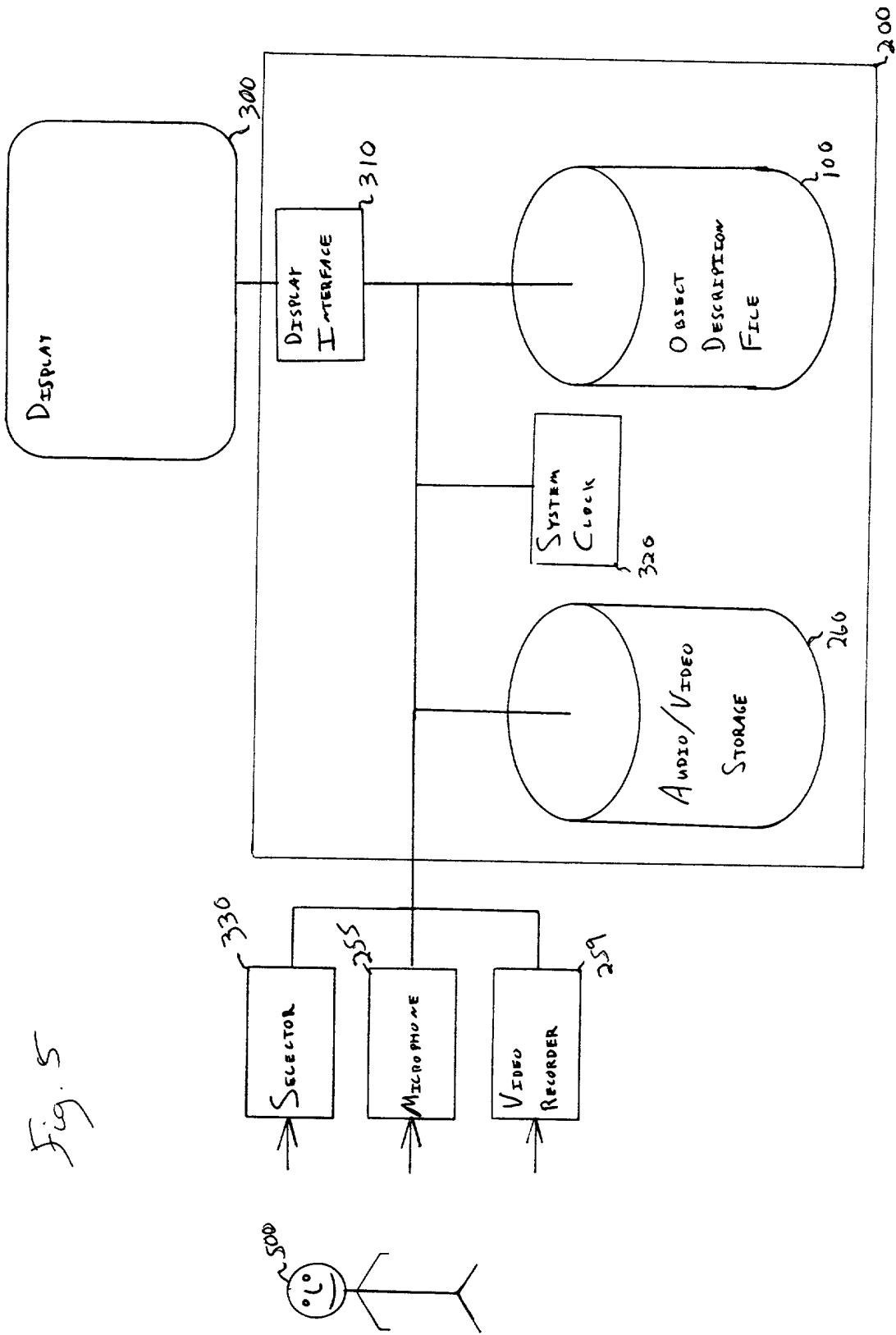


Fig. 4

Fig. 5



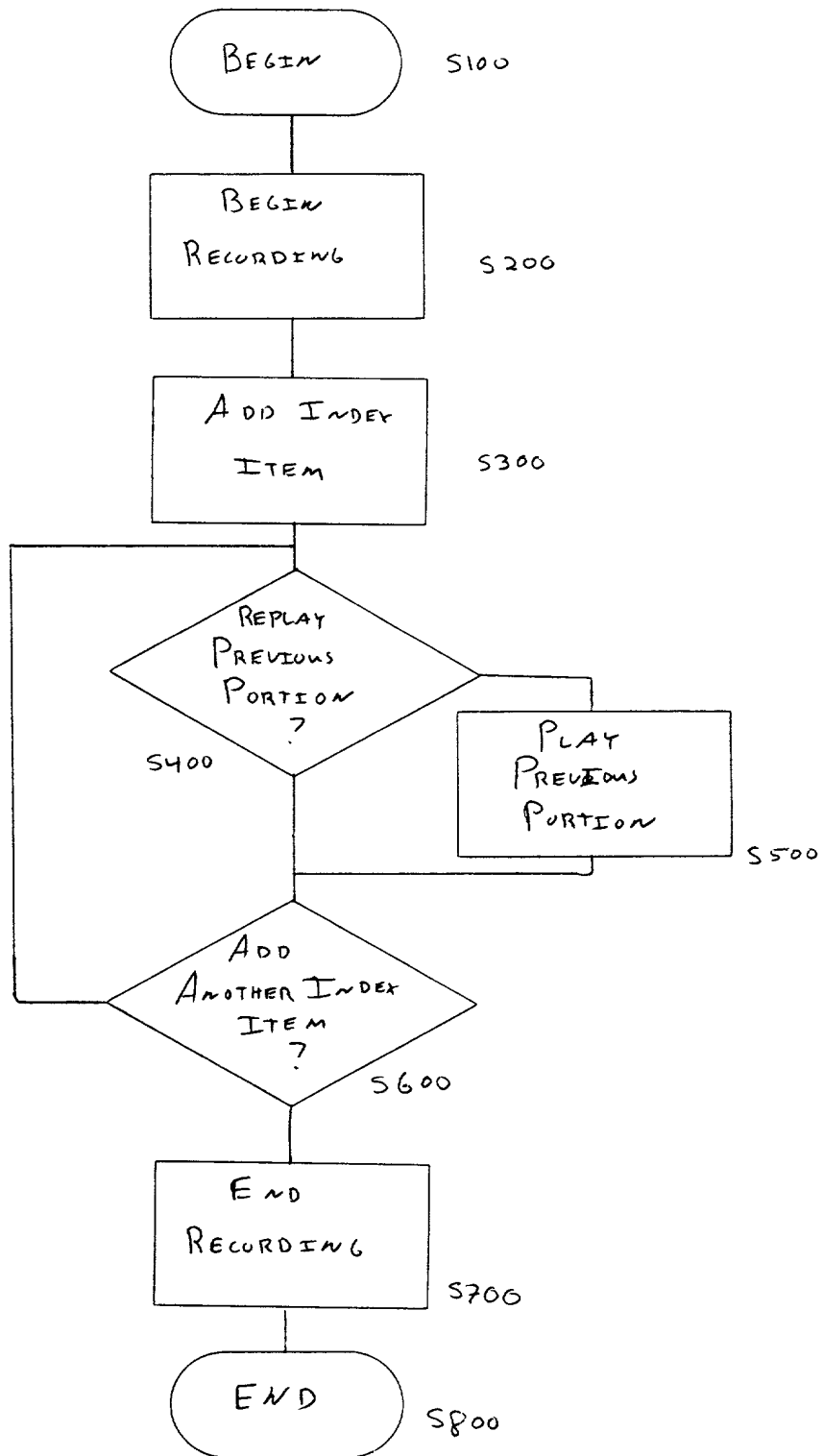


Fig. 6

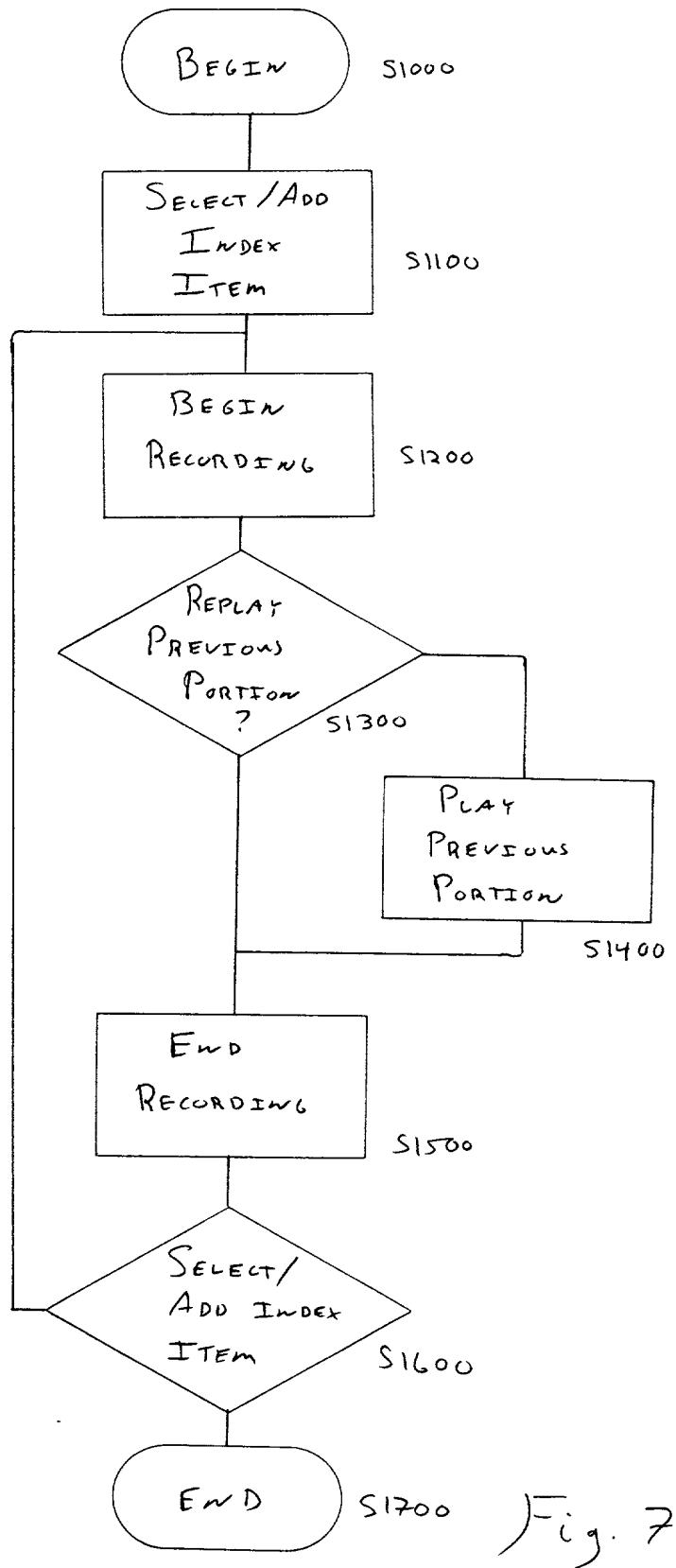


Fig. 7

Fig. 8

